Fermilab Independent QA Assessment Report

Assessment Number & Title: 11-IA-QA-12 FESS – Measuring and Test Equipment (M&TE) **Version:** 1.0

Date(s) of Assessment: 07/25/11 – 07/29/11

Performing Organization: Office of Quality & Best Practices

Assessed Organization(s): Fermilab Engineering Services Section (FESS) including the following departments:

- Operations
- Engineering
- Site Services
- ES&H

Assessment Activities & Scope:

Implementation and effectiveness of controls for Measuring and Test Equipment (M&TE) relative to the requirements of Integrated Quality Assurance (IQA) were examined via interview, observation, and document & record review. These controls were examined across the FESS departments listed in the "Assessed Organization(s)" section of this report.

Scope Limitations:

The scope of this assessment was limited to the three departments listed in the "Assessed Organization(s)" section of this report.

Activities Reviewed Within this Assessment:

- GPS survey
- Water treatment
- Roads & Grounds maintenance
- Ferro scan for rebar location
- Gas detection

Description of the Implementation & Effectiveness of Observed Activities:

Measuring and Test Equipment:
M&TE requirements found in IQA chapters five and eight have been implemented within the FESS departments assessed, although one exception is identified in the Findings section of this report. M&TE used for inspection, test, process monitoring, and data collection are identified, calibrated, maintained and controlled commensurate with their intended use.

Operations is responsible for infrastructure maintenance and waste water treatment.

Waste water Treatment is an activity that requires the use of three pH meters to check the pH of the water. Two meters are permanently attached to tanks, and one is handheld (671P (pH) Analyzer). The permanent meters are checked against the handheld meter for calibration. (File 1) The handheld meter is calibrated using buffer solutions as standards. Buffer solutions for calibration of the handheld pH meter were in use beyond specified expiration dates of February and March 2011 when observed on August 01, 2011. The "PH/ORD" sensor storage

solution contained the instructions "Store below 86^{o} F, do not freeze" but the solution is stored in a cabinet at conditions (89^{o} F in Batavia per "The Weather Channel" website) in the Central Utility Building (CUB) that were beyond manufacturer's recommended storage conditions.

Site Services is responsible for landscaping, snow removal, roads and grounds maintenance, and GPS Surveys.
Landscaping, snow removal, and roads and grounds maintenance uses no equipment that requires calibration. This was confirmed by observation of grounds equipment including trucks, tractors and plows. GPS survey is an activity that assigns Global Positioning System (GPS) coordinates to geographic features to improve locating capabilities of FESS for structures. Calibration is performed by the person using the GPS locator by placing the locator on a known reference standard on the ground and verifying that the locator is within the allowable manufacturer's variation. Records of calibration are kept and retrievable (File 2).

Engineering is responsible for design of buildings & landscape using Computer Aided Design programs and for oversight of contracted Architects & Engineers, and construction.
Critical measurements and tests such as concrete slump tests (File 3) are the responsibility of the performing subcontractor. Results of such tests are reviewed by Engineering. These test results represent a legal contract obligation for which the supplier is liable. (File 4) Engineering performs Ferro scanning using a self-calibrating "Hilti model PS200S Ferro scan". The Ferro scan's purpose is to detect presence of iron alloys such as conduit, rebar, and plumbing. In the event a self-test error code is displayed, the unit is sent back to the manufacturer for repair/calibration.

ES&H is responsible for overseeing activities for proper practices involving safety and health including gas detection.
Gas detection is performed whenever personnel are required to enter an enclosed space. They use the same gas detection procedures as the Fermilab Fire Department and the gas detector is calibrated before each use. (File 5)

Conclusions:

There is no FESS-wide M&TE program; however specific M&TE are managed by the local organization using them. The FESS departments examined during this assessment have implemented the M&TE requirements found in IQA chapters five and eight with one exception noted in the Findings section below. This includes identification, calibration, maintenance, and control of M&TE used for inspection, test, process monitoring, and data collection. FESS has few items that require calibration.

Findings:

Buffer solutions used as standards by the Central Utilities Building to measure pH and calibrate other instruments were out of tolerance when in use contrary to the requirements in IQA chapter 8.

Two solutions were in use on August 01, 2011 beyond the manufacturers expiration dates of February and March 2011
The "PH/ORD" sensor storage solution was stored at 89^{o}F exceeding the manufacturer's recommended upper storage temperature of 86^{o}F

Paragraph 8.5 of the IQA states "When M&TE or standards are found to be out of tolerance, appropriate evaluations are performed to assess any adverse impact on previous inspection, testing, data collected or calibration using that equipment and to determine the acceptability of items previously inspected or tested and appropriate notifications made. The evaluation, including conclusions, is documented. All M&TE equipment not operating to specifications is identified and pulled from service or locked out and are not returned to service until passing calibration requirements."

Observations and Recommendations:

1. **Observation:** The person maintaining the pH meter stated that buffer solutions used in the handheld pH meter were decanted from larger containers to smaller containers that fit within the case of the meter.

   Recommendation: While this practice doesn't violate calibration traceability it does create the possibility of introducing contaminants into the decanted bottle. Consider buying the solution in smaller bottles to eliminate the need to decant.

2. **Observation:** During the time of the assessment supplier generated calibration data such as repairs required, if any, tests and standards used to perform calibration, measurement results taken before and after calibration, was not available.

   Recommendation: Investigate to see if the suppliers maintain past calibration data, referenced in the observation above, and if it can be provided in the future.

Commendable Practices:
None

Names of Person Interviewed:
Russ Alber
Mike Becker
Mike Bonkalski
Gary Konen
Lonnie Huitt
Chip Kee
Bridgett Thomson

Documents Reviewed:
PO req 215276 for water treatment consulting
Confined Space Reclassification Form recording gas measurement calibration
Fermi Base Geodetic Position
Calibration records of GPS unit
Instructions for calibrating the 671P (pH) Analyzer

Standards, Regulations, and Other Program Requirements Applied:

The specific criteria applied to this assessment were:

1001 IQA section 5.4.2, Maintenance (relative to M&TE)
1001 IQA section 5.4.4, Calibration of Process Equipment
1001 IQA section 8.5, Control of Measuring &Test Equipment

Describe or List Any Other Assessment Methods Used:

None

Corrective Action Plans Issued: FS-2011-08-29-1 Buffer solutions used as standards by the Central Utilities Building to measure pH and calibrate other instruments were out of tolerance when in use

contrary to the requirements in IQA chapter 8.

Assessors' Names (asterisk indicates team leader):

- Frank Cesarano - BSS
- Tom Gehrke* - OQBP

Submitted by: Tom Gehrke **Date:** 08/25/11

Distribution (Distribute to assessed organizations' management, OQBP head, and other interested parties):

Randy Ortgiesen
Bob Grant
Ed Vokoun
Jed Heyes
Frank Cesarano

Attachments:

File 1 Instructions for calibrating the 671P (pH) Analyzer
File 2 Calibration records of GPS unit
File 3 05210.02 Report
File 4 PO req 215276 for water treatment consulting
File 5 Confined Space Reclassification Form recording gas measurement calibration